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# 8051 MICROCONTROLLER ARCHITECTURE

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Target Audience : 5<sup>th</sup> Semester Students

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# Learning Objectives

After learning this chapter, students should be able to:

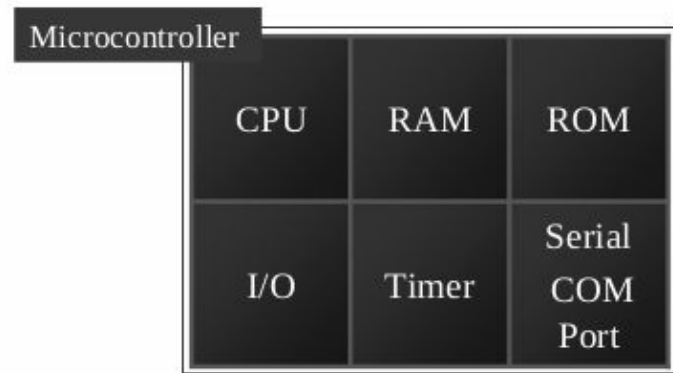
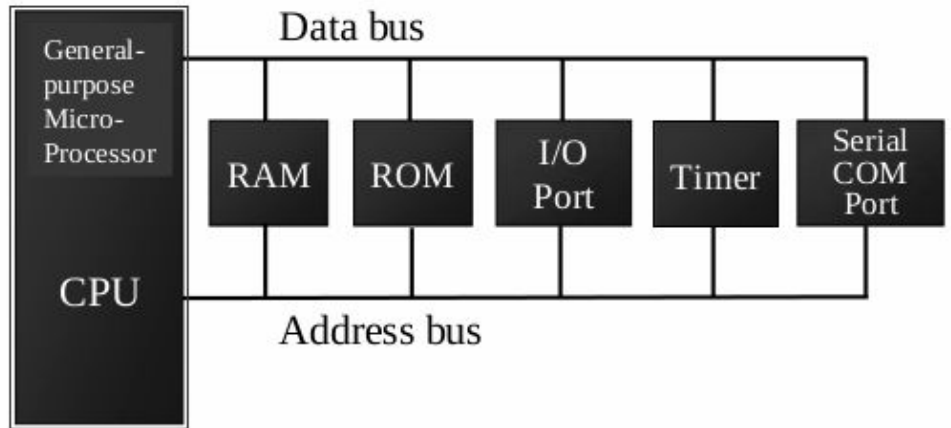
- Describe the hardware features of the 8051 Microcontroller
- List the Internal Registers of the 8051 Microcontroller with their functions
- Clock Cycle and Timing Cycles
- Pin Diagram and Pin Functions
- Describe Operating Modes of Timer/Counters and associated Control Registers
- Describe types of interrupts, the interrupt program addresses, and the interrupt control registers

# Difference between MP and MC

Microprocessor does not contain RAM, ROM, I/O Ports.

Microcontroller contains:

- CPU (microprocessor)
- RAM
- ROM
- I/O Ports
- Timer
- ADC and other peripherals



## General Purpose Microprocessor

- Must add RAM, ROM, I/O ports, and timers externally to make them functional
- Make the system bulkier and much more expensive
- Have the advantage of versatility on the amount of RAM, ROM, and I/O ports

## Microcontroller

- The fixed amount of on-chip ROM, RAM, and number of I/O ports makes them ideal for many applications in which cost and space are critical
- In many applications, the space it takes, the power it consumes, and the price per unit are much more critical considerations than the computing power

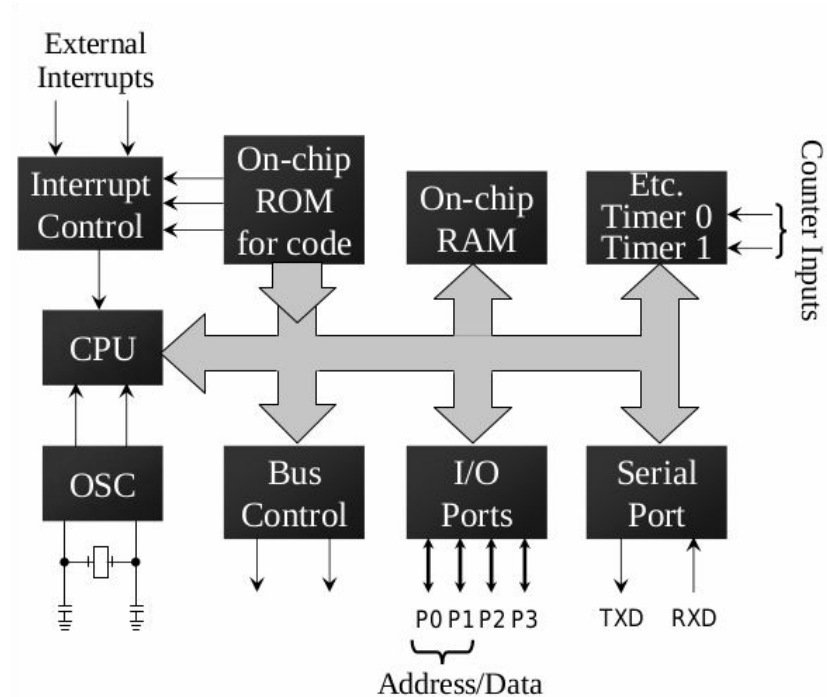
# Microcontroller Features

Intel introduced 8051 Microcontroller, MCS-51 in 1981.

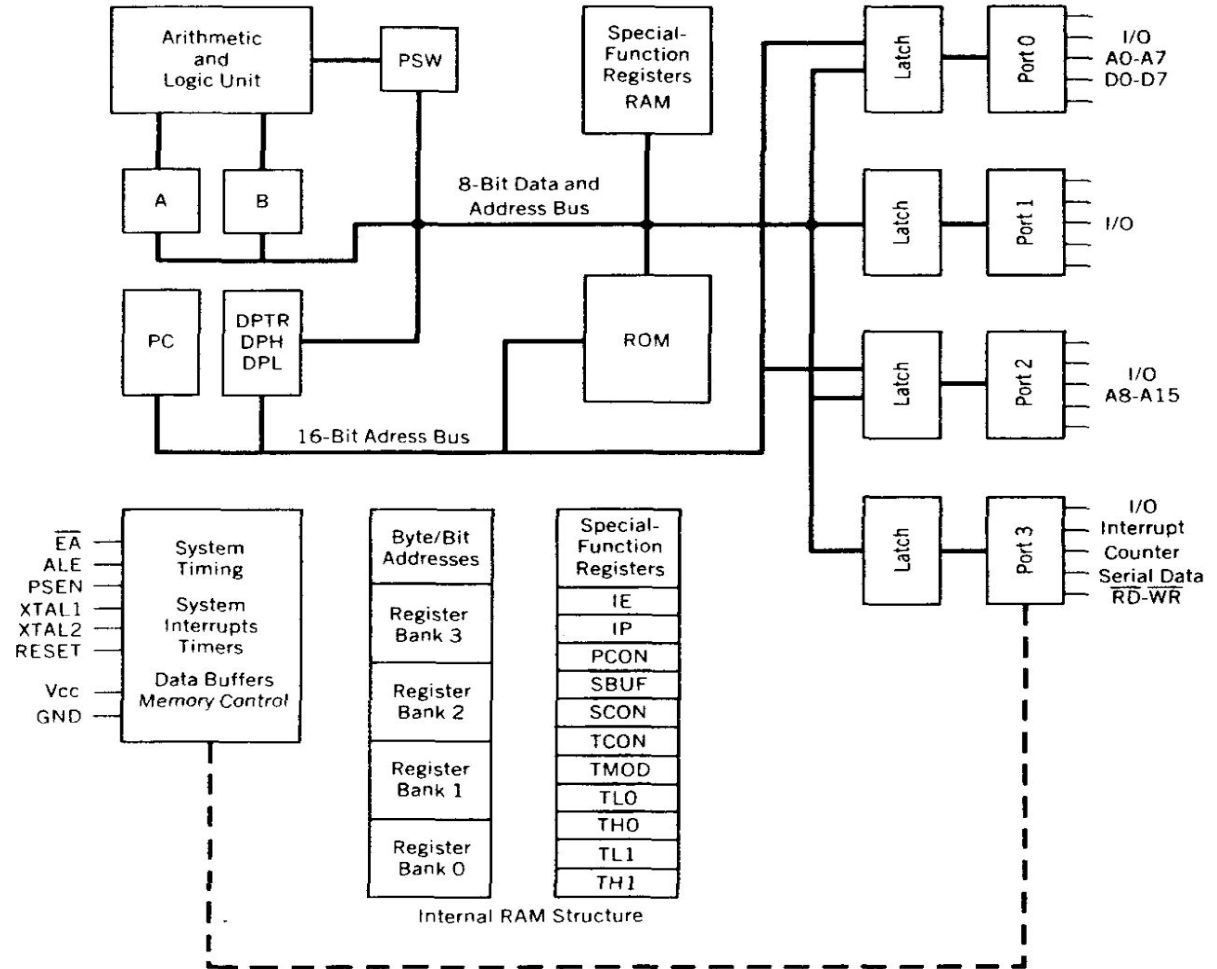
Specific feature are :

- 8-bit CPU with registers A (Accumulator) and B
- 16-bit Program Counter (PC) and Data Pointer (DPTR)
- 8-bit Program Status Word (PSW)
- Internal ROM of 4k bytes
- Internal RAM of 128 bytes
- 32 I/O pins arranged as ports: P0-P3
- Two 16-bit Timers/Counters T0 and T1
- Control Registers, Interrupt, Oscillator and Clock Circuits

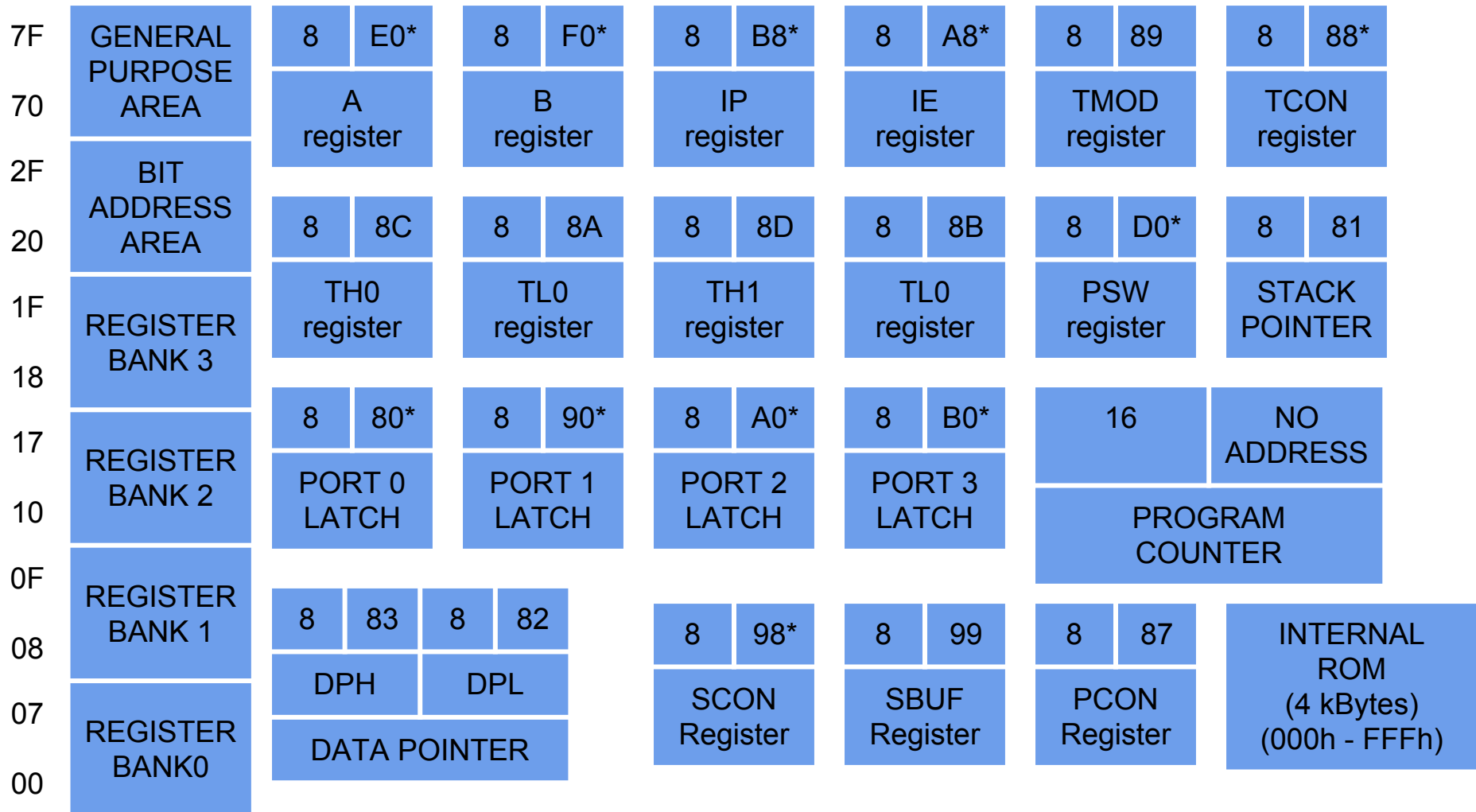
# 8051 Microcontroller



# 8051 Microcontroller Block Diagram

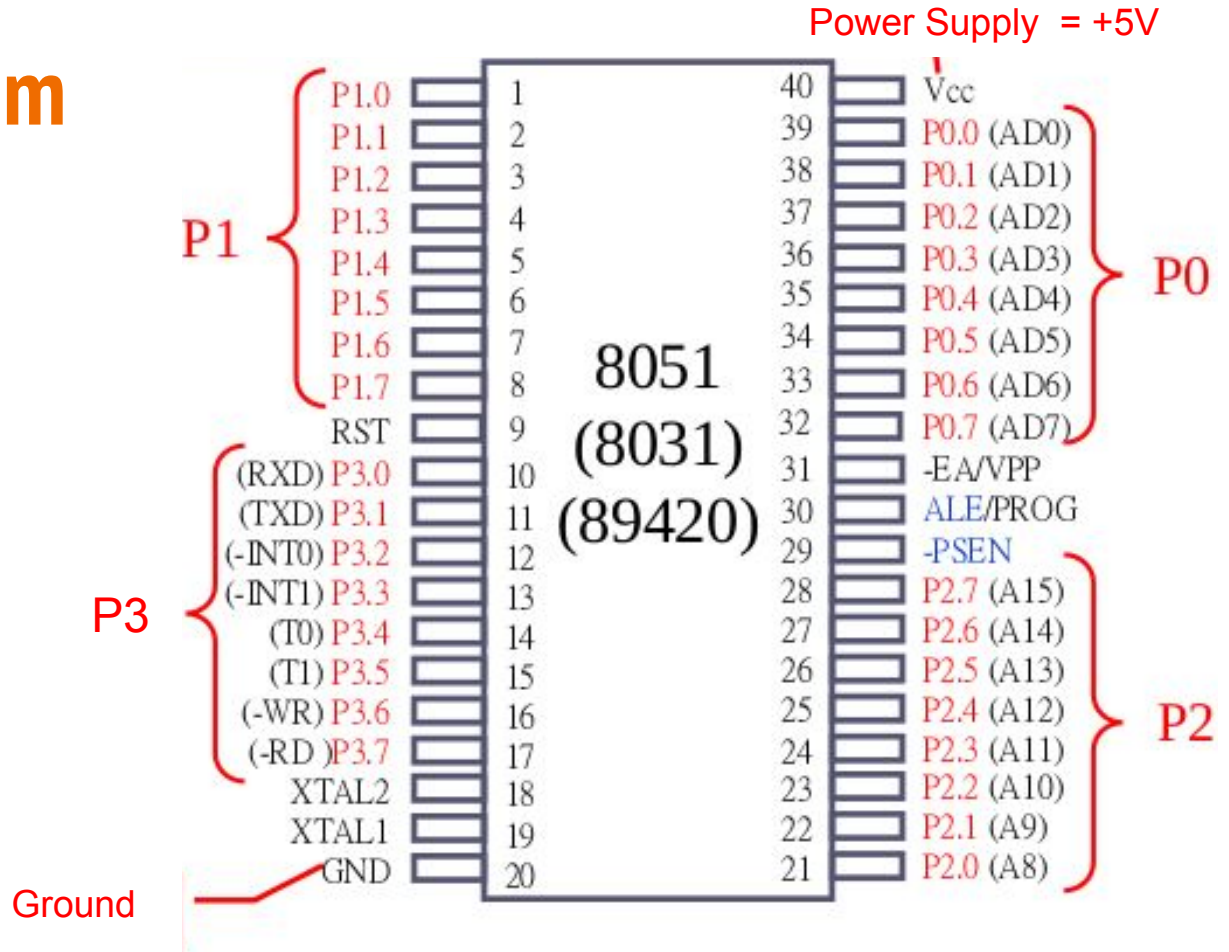






# 8051 Pin Diagram

Ports (P0 - P3) are of 32 pins out of Total of 40 pins.  
Each port uses 8 pins.



# Registers

Registers are used to store data temporarily, while the information could be

- A byte of data to be processed
- An address pointing to the data to be fetched

Most of 8051 registers are of 8-bit.

# Registers

Most widely used Registers are:

- A (accumulator)
- B
- R0-R7
- DPTR (DPH and DPL)
- Program Counter (PC)

